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N° 5686 A.D. 1902

Date of Application, 7th Mar., 1902—Accepted, 27th Nov., 1902

COMPLETE SPECIFICATION.

"Rotary Engine or Pump with Annular Pistons Rotating at an Acute Angle round a Common Axis".

I, JOHANN MICHAEL WEISS, of Berchtesgaden, Upper Bavaria, in the Empire of Germany, Merchant and Purveyor to the Royal Household, do hereby declare the nature of the said invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement:

The present invention relates to an engine which can be used either as a motor and with suitable modifications as a pump, and which therefore allows of converting into motive power the continuous pressure of fluid in motion (for instance water under pressure) supplied to the engine, or of sucking in or propelling fluids by means of rotary motion acting on the shaft.

Generally speaking the construction is similar to that of ring cylinder engines, the special feature essentially consisting in the arrangement of a pair of piston wheels or piston rings rotating on a common shaft in the manner shown in Figs. 1 to 15 of the annexed drawings.

Fig. 1 is a vertical section in detail before assemblage. Fig. 2 represents the pair of piston wheels fixed to the shaft, but in another position, Fig. 3 a piston disc, Fig. 4 a finished ring piston, Fig. 5 a vertical section of the assembled engine, with casing. Fig. 6 a similar section of a combination in which the casing and the shaft are somewhat modified, Fig. 7 a front view of the standard of the casing, with a piston, Fig. 8 a piston with a toothed disc, and Fig. 9 an elevation of the whole engine in partial section.

Figs. 10 to 15 represent a modified form of the piston and are described hereinafter.

The casing comprises a core *a* with covers *b* and *c* and contains two channels b^1 and c^1 which unite in the upper part at an actute angle. In the casing a shaft *d* is journalled supported as shown in Figs. 1 to 5 by a stuffing box *e* on one side and by the cover *b* on the other side.

Parallel to the line of the channel c^1 an annular groove *f* is formed round the bearings of the shaft. To the disc *g* (Fig. 3) and the annular disc *h* (Fig. 4) cheeks g^1 and h^1 respectively are fastened at the top and bottom and these together form the circular pistons. In the form of construction illustrated the two annular pistons are semi-circular. Of these two pistons that with the disc *g* is directly secured to the shaft *d*; the other, the disc *h* of which is turned out to form a ring, lies with the said ring in the groove *f*.

The piston *g* moves with the shaft, the piston *h* rotates in the groove *f*, but both rotate round the same central axial line. Fig. 6 shows the casing and the shaft *d* slightly modified to facilitate the assembling of the parts. The pistons half fill the channels in the casing and in the same manner as these channels unite at an acute angle in the upper part, each piston passes the uniting point. This point, the closing point, is therefore always occupied by one or the other of the pistons and the path between A and B (Fig. 9) that is to say between the supply port and the exhaust port always remains closed. Connected for instance, with a supply of water under pressure, the water entering at A exerts equal pressure on both sides of the piston at the closing place that is to say, exerts equal pressure above and below the shaft, and therefore remains without effect; the other piston, however, must yield to the one-sided pressure brought to bear upon it and pushes the passive piston forward without resistance until the closing

[*Price 8d.*]

place is passed when a change in the relative action takes place. Since the ends of the pistons are cut off at right angles and only require a slight bevelling on the inside at *x* (Fig. 2) no dead space is produced and therefore no interruption in application and action takes place.

Described in detail the action of the engine is as follows:

Let it be assumed that when the supply cock is opened the pistons *g* and *h* are in the position shown in Fig. 5, that is to say that the ends of the pistons are perpendicular the two at the top being in contact and covering each other at what I have termed the closing place. The piston *g* then fills the entire inlet side of the channel *b*, and the water pressure has no effect upon it. The upper end of the piston *h* is also still inaccessible to the water, but the lower end surface of the said piston is fully exposed to the pressure and is therefore pushed back towards the out-flow side. By this movement the two upper piston ends, which are gradually laterally displaced, following the bifurcation of their channels, are moved under the opening and into the influence of the inlet, so that the piston *h* is gradually subjected to equal counter pressure and becomes passive whereas the piston *g* receives pressure at the end which has entered the inflowing current, and therefore continues the motion initiated by the piston *h*, until its other end passes the closing place whereupon the action is repeated. During this semi-rotation the pistons will have passed the position indicated in Fig. 2, in which both ends of the piston *h* are below the inlet and exhaust ports so that the water in the lower half of the channel c^1 is stagnant and is carried on, the communication between the channels being interrupted by the end surfaces of the pistons, which abut against each other horizontally on both sides.

By this circular piston action, space is continuously and uniformly created on the inlet side, and this space disappears in the same manner on the other side, displacing the used water from the channels into the outflow conduit B. The piston action then rotates the shaft *d* with a power proportional to the piston area and the water pressure.

If the engine is to be used as a suction and pressure pump the form of construction described need only be modified by coupling the pistons. This can be done for instance, by providing teeth *i* on each disc of the piston in such a manner that these teeth gear with each other at the top (Fig. 6). The machine can however be directly adapted for use as a pump by giving the piston a somewhat different form, as shown in Figs. 10 to 15. In this case no coupling teeth or the like are required.

This modification consists in dividing the semi-circle of each piston, that is to say in making it in a plurality of parts, this number being larger than two, or only two as shown in the drawings. Figs. 10 and 11 show the disc and ring *g h*, Figs. 12 and 13 the pistons, formed by fastening on the cheeks g^1 h^1 and Figs. 14 and 15 are cross-sections of the pistons.

In this case, as before, each piston consists of a semi-circle formed of two parts, each of ½ of the circle placed opposite each other. With this form of construction it is less important than in the one previously described that the ends of the pistons should fit exactly and tightly together, since in all positions of the pistons in the channels the opposed ends of the pistons form a closure.

The engine can be used as a motor for the purposes of all the lower branches of industry, as for instance for driving blowing apparatus, grinding machines, turning lathes, dynamos, and the like, its construction and application being extremely simple and its manufacture very cheap. With the proper piston area suited to the hydraulic pressure available, and to the power required the simple opening and closing of the water cock will start and stop the engine at once, or regulate the speed. If a fall can be provided for the exhaust water the reaction or suction will increase the efficiency up to the equivalent of one atmosphere.

As a pump the engine is suitable for drawing and for propelling liquids and can be directly connected with any transmission. Further with two engines of this class co-operating together, one supplying the power for driving the other,

the object of water column machines is obtained in a more rational manner. The steady action of the engine prevent the injurious intermittent reaction which is unavoidable with the oscillating stro e of the water column engine, and other advantages are also obtained. For wat r supply purposes, if a water ram is used part of the spring water supply, or if the power of a stream is used the whole of the said supply can be conveyed to a height and drinking water lying at a deeper level can be brought without lo s of water, to a common level by the aid of the head on the water of a spring or st eam at a higher level.

Having now particularly described and ascertained the nature of my said invention and in what manner the s me is to be performed I declare that what I claim is:

1. A rotary piston engine, comprising two piston discs (*g h*) placed at an acute angle to each other but rotating in channels (b^1 e^1) of the casing round a common axial line, the said channels also uniting at an acute angle.
2. In a rotary engine of the type described the form of the pistons (g^1 h^1) in which each extends through a semi-circle.
3. In a rotary engine of the type described, the form of the pistons (g^1 h^1) in which the piston of each disc is divided into two or more parts extending through a portion of the periphery of the circle.

Dated this 7th day of March, 1902

HERBERT HADDAN & Co.,
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18 Buckingham Street, Strand, W.C.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1902.

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A.D. 1902. March 7. No. 5686.
WEISS' Compass Construction.

SHEET 1.

Fig. 3

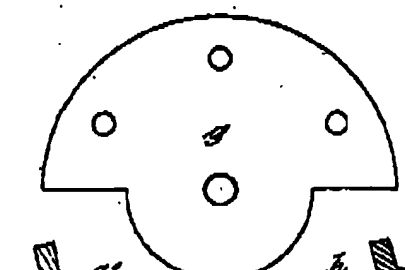

Fig. 4

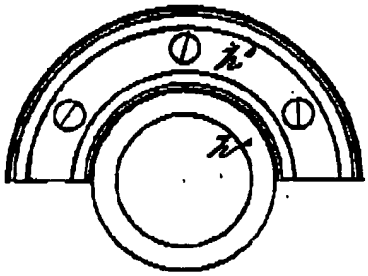

Fig. 1

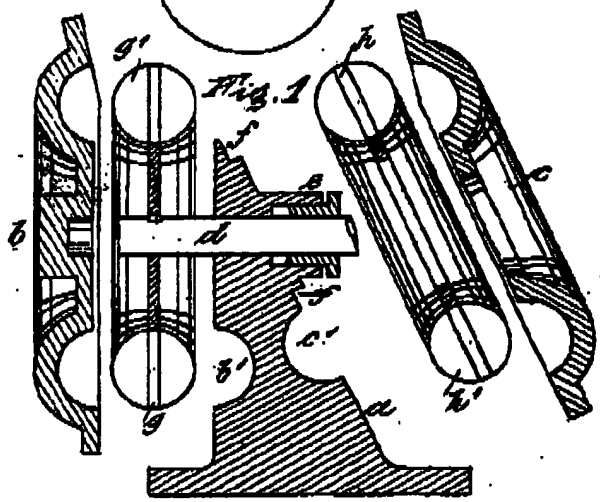

Fig. 2.

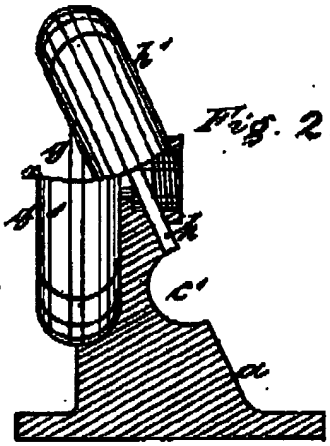

Fig. 5

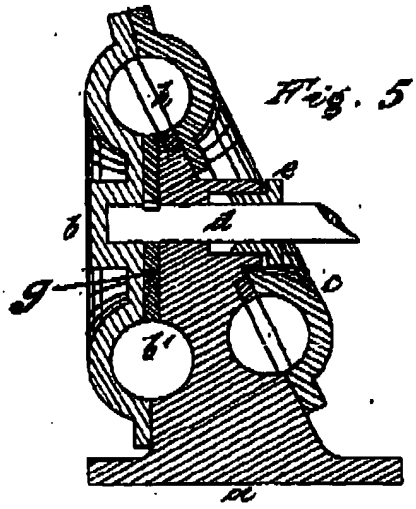

Fig. 6

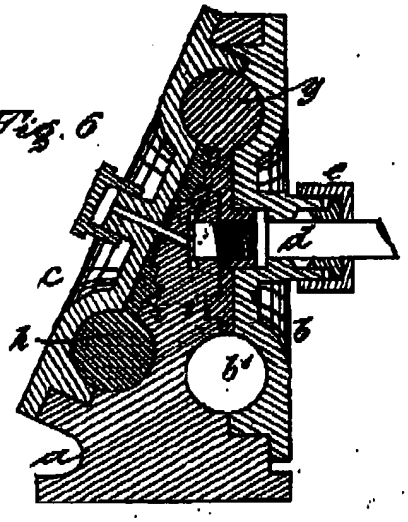

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Fig. 7

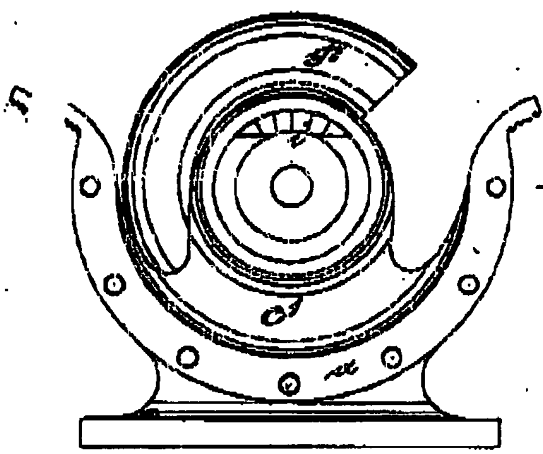


Fig. 8

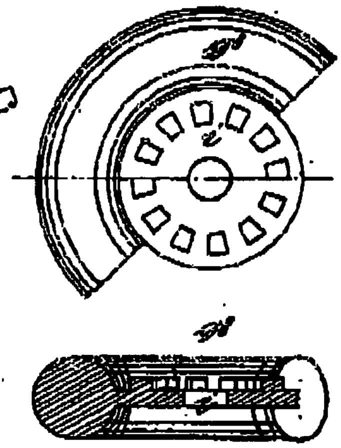
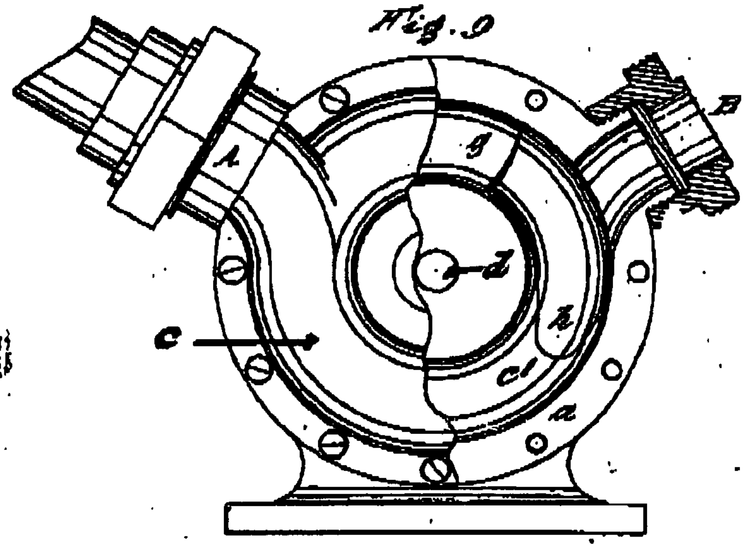


Fig. 9



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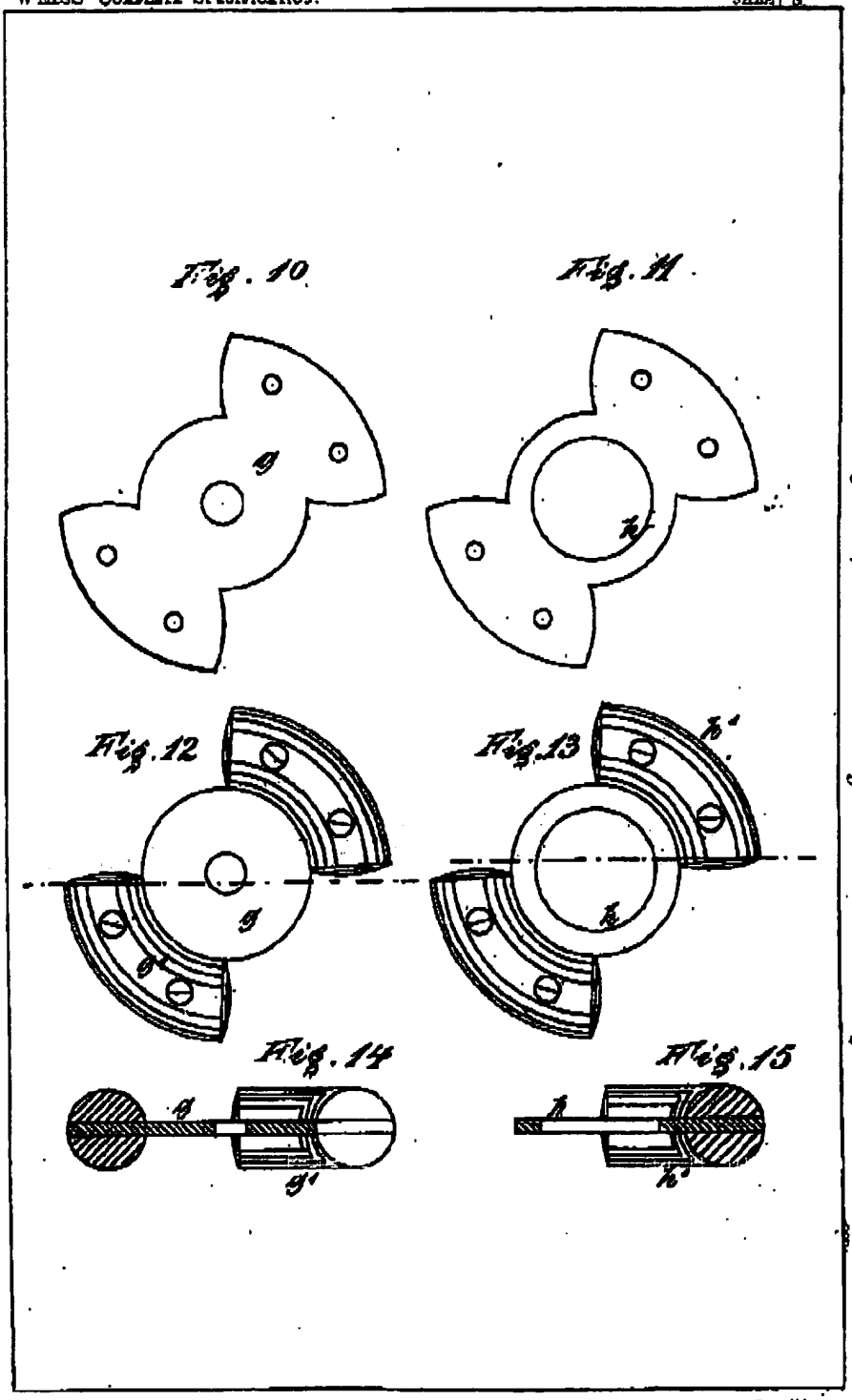
A.D. 1902. March 7. N° 5686.
WEISS' Complete Specification.

(3 SHEETS)
SHEET 3.



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